
Process Evaluation Section

Production of Hydrogen and Other Chemicals From Low-Btu Natural Gas Reservoirs

Problem/Opportunity

A large number of natural gas discoveries are not utilized because they contain substantial amounts of N_2 and/or CO_2 . As a result, they have low-Btu values and are not of commercial quality. Separation of the in-organics to upgrade the gas to pipeline or commercial quality (~1000 Btu per standard cubic foot) is technically feasible by a number of methods. However, these gas separation processes are expensive and energy intensive. We are investigating promising processes that could produce valuable chemicals from such gas mixtures without having to separate the inert gases from the hydrocarbons. We are evaluating the technical feasibility, environmental impact and cost effectiveness of these processes to utilize the high N_2/CO_2 gas “as is” for making commercially valuable chemicals such as NH_3 , CH_3OH , C_2H_2 , $CO(NH_2)_2$, and H_2 . These could be used as is or as feedstock chemicals for producing other chemicals or as carriers of H_2 as a fuel.

Approach

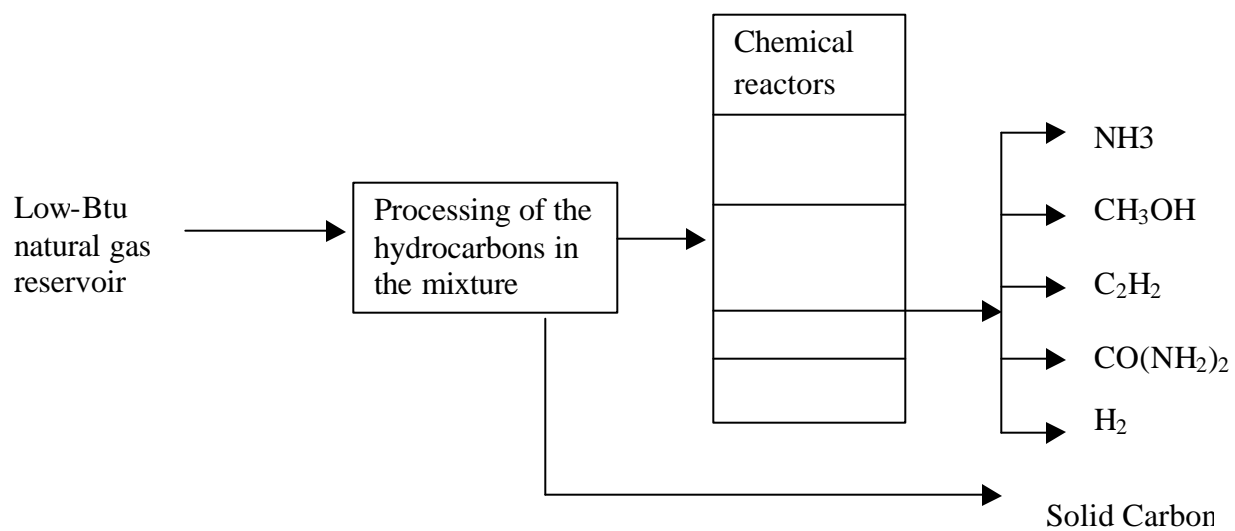
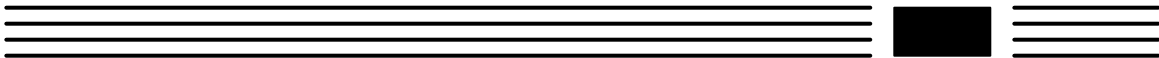
We are conducting technical and economic evaluations of various proprietary process concepts for utilizing high N_2/CO_2 , low-Btu natural gas reservoirs to produce chemical products having greater commercial value. The work is organized into the following tasks:

- (1) Development of detailed conceptual designs and flow diagrams, and performance of thermodynamic and economic analysis on these designs using the ASPEN Plus® simulator.

- (2) Assessment of the environmental impact of these processes.
- (3) Economic and trade-off analysis of the various designs.
- (4) Identification of research needed to reach commercialization.

Results

This research addresses the technical feasibility, cost effectiveness and environmental soundness of the processes utilized to convert high N_2/CO_2 , low-Btu natural gas reservoirs (without separation of the raw gas) to valuable chemicals. Once the technical feasibility, cost effectiveness and environmental soundness of the processes is established for specific designs, the process(es) will be tested in the laboratory at different scales.



Argonne's Process for Production of Hydrogen and Other Chemicals from Low-BTU Natural Gas Reservoirs.